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A Fiber-optic Endoscope for Spinal Cord

—Spinaloscope—

by

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Many investigations have been made on the brain, while little has reported on the same subjects of the spinal cord.

Less analytical attention has been paid to the spinal cord, partly because there are many difficulties of the direct visualization on the spinal cord from the clinical standpoint and there is less opportunity of autopsy-study on the spinal cord.

Although fiber optic endoscopes are already applied to stomach, esophagus, bronchus and so on, nobody has developed the fiber optic endoscope on the spinal cord.

We constructed so much excellent fiber-optic endoscope on the spinal cord, as Spinaloscope (KTM-10).

The instrument (Fig. 1) has a grassfiber optic image guide and a same light guide, both of which have been coated with nonmetal coating. The image guide is round and 20 mm in diameter, and it provides a range of focus from 5 mm to 20 mm.

The light guide is round and 20 mm in diameter and it provides a spot of intense, cold, white light. Both fiber-optic instruments are packed in a compact bundle and cemented with non-metal coating and cured by a process that allows the fiber optics to be disinfected without collecting water between fiber bundles.

A fiber-optic light carrying cord (light guide) is 200 cm long and is connected to a variable high-intensity light source, and it allows the light source to be well out of the sterile operating field.

These image conducting and light conducting cords can be formalin-gas-sterilized or gas autoclaved, and it has been our practice to gas-sterilize the entire spinaloscope-optical-assembly as a unit. The light source is a Matsushita 150 watt reflecting-type projector bulb mounted in a fan-cooled housing.

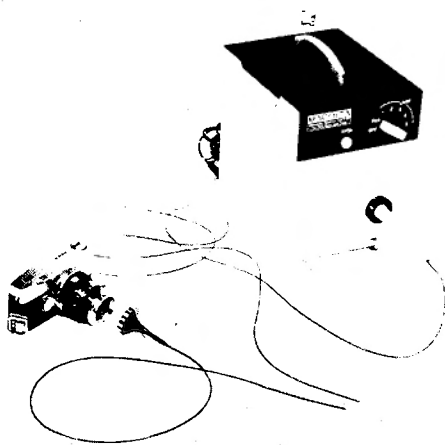


Fig. 1 Spinaloscope

When working in a particularly bloody field, the tip of the fiberoptics must be periodically cleared by rinsing with irrigation or by wiping with moist cotton.

This instrument has been used to show the surface of spinal cord, to identify pathological changes of spinal cord surface or blood vessels on spinal cord. And it can be utilized to illuminate and observe the needle electrode of cordotomy in percutaneous procedure or operative procedure.

The level of the tips of endoscope can be possibly determined under rentogenological visualisation (Fig. 2).

Now only in animal experiments, which were performed under laminectomy procedure, good results are obtained by spinaloscope. In Fig. 3 were observed some features of spinal cord surface and blood vessels to spinal cord. And also in Fig. 4 was showed illustration of Fig. 3.

Preliminary studies and experimental trial indicate that spinaloscope offers many advantage over observation of behavior on spinal cord surface, and also that side effects of spinaloscope can be avoided with careful handling.

As the results of animal studies, the spinaloscope is proposed as a useful method in spinal cord surgery and also at clinical and experimental laboratory examination. The technique is simple and photograph can be easily obtained. Clinical trial of spinaloscope is also possible. Results of clinical finding with spinaloscope is under study and would also soon be reported.

ACKNOWLEDGEMENT

We wish to express our deepest gratitude to Prof. Dr. CHUJI KIMURA for his helpful advice and kind guidance throughout this study.

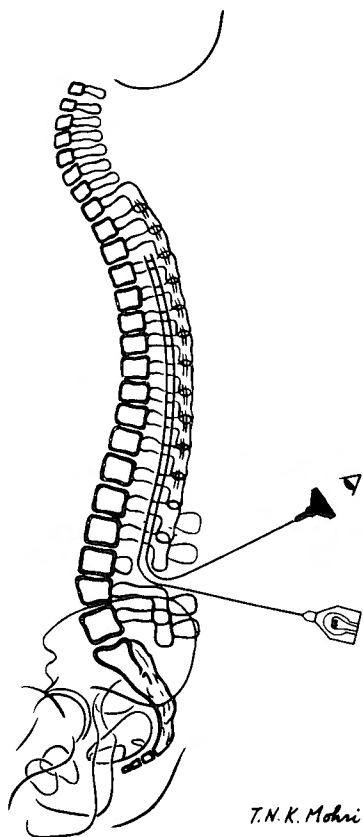


Fig. 2 Scheme of spinaloscope procedure

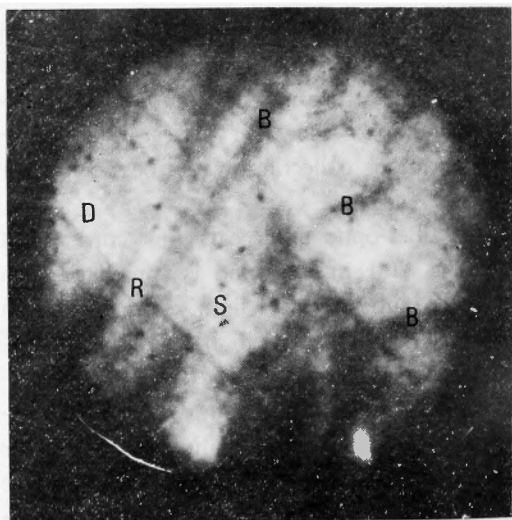


Fig. 3 Photograph of spinal cord surface

B : Blood vessels of the spinal cord
D : Dura mater
R : Dorsal root of spinal cord
S : Spinal cord

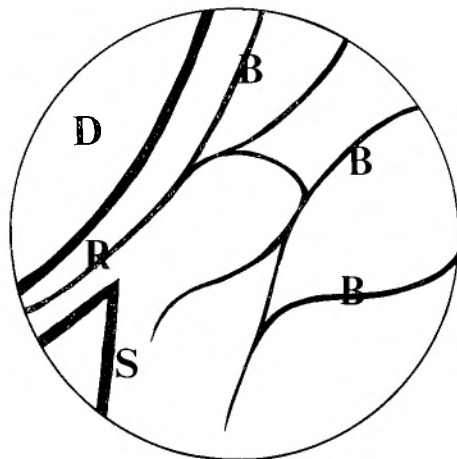


Fig. 4 Illustration of Fig. 3

Note : This work was presented at the Ninth Annual Meeting of Japanese Society of Neurology (Nihon Shinkei Gakkai), April 4, 1968 at Niigata, and also supported by grant of Monbusho-kagaku-kenkyuhi No. 72075.

This instrument is not commercially manufactured, but is available on order from Machida Endoscope Mfg. Co., Tokyo.

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和文抄録

脊髓鏡による脊髓検査法に関する研究

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脊髓に関する我々の研究の一環として、脊髓表面観察、血行動態、血管病態の検査、検討の目的のため、脊髓鏡を試作した。この脊髓鏡は、各々外径2mmのグラスファイバー集束よりなる、導光体と導像体により

構成される。手技としては、臨床的には、経皮的脊髓腔穿刺による挿入及び観察を目的としているが、今回は、犬による動物実験をおこない、椎弓切除術を実施した上、観察、写真撮影を実施した。